

PANOLIN[®] +

Swiss Oil Technology



High Performance
Environmentally **A**cceptable **L**ubricants
for your dredging application



PANOLIN[®] +
Swiss Oil Technology

PANOLIN International Inc.
Blaesimuehle 2 – 6
CH-8322 Madetswil
Switzerland
Phone +41 (0)44 956 65 65
www.panolin.com
international@panolin.com

Company profile

- Founded in 1949 by Bernhard Lämmle
- Headquarters in Switzerland
- Inhouse R&D (Research and Development)
- Core competence: high performing EALs (Environmentally Acceptable Lubricants) since 1983
- Worldwide availability through PANOLIN warehouses and distribution network



Bernhard Lämmle
* 1910 † 1986

◀ PANOLIN Scandinavia AB – Sweden
 ◀ PANOLIN UK Ltd. – England
 ◀ PANOLIN America Inc. – USA
 ◀ PANOLIN Headquarters – Switzerland

PANOLIN Holding AG

PANOLIN AG

Market areas: Switzerland and
Principality of Liechtenstein.

PANOLIN International Inc.

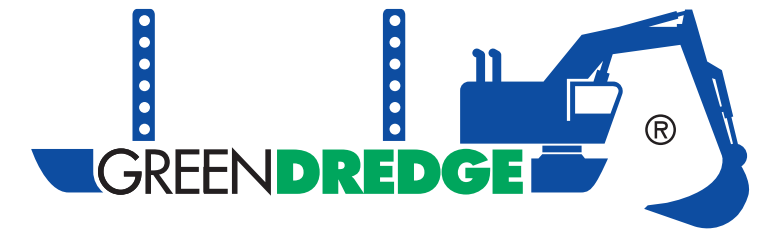
All international business.

PANOLIN Production AG

R&D and production.

We want to standardize high performing EALs globally to preserve the environment.

The concept

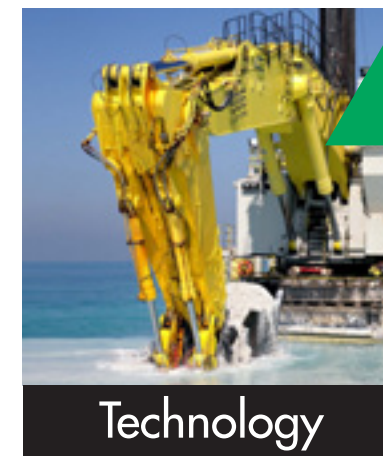


Economy



Save money

- Preventative maintenance
- Extended oil change intervals
- Less equipment downtime
- Reduction of life-cycle cost



Technology

Increase performance

- Advanced technology
- More reliability
- Higher efficiency
- Improved availability



Environment

Protect the environment

- Environmentally acceptable
- Biodegradable
- Meets global regulations
- CO₂ reduction

Only economically viable, technically mature and environmentally friendly concepts are truly sustainable.

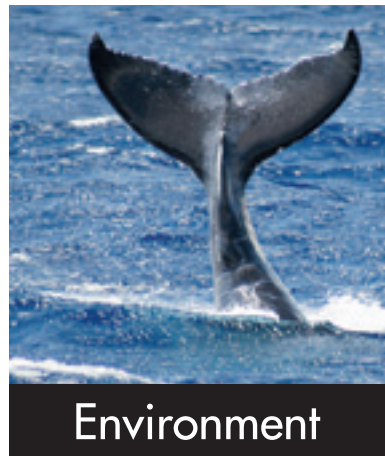
Your benefits

Over 35 years of experience in biodegradable oil technology



Increase performance

- Fully saturated synthetic ester based lubricants made for dredging applications
- High thermal and shear stability
- Excellent oxidation stability
- Outstanding wear and corrosion protection
- Hydrolytic stability – low acidity, non-emulsifying
- No deposits – protection of your system
- Numerous OEM approvals
- Higher efficiency – higher output of the equipment



Protect the environment

- Readily biodegradable lubricants
- Minimally toxic
- CO₂ reduction due to less oil/fuel consumption; take advantage of the PANOLIN CO₂ calculator
- Compliant with global regulations and international eco-labels
- Beneficial for job tenders
- Supports your environmental compliance policy



Save money

- Robust and reliable lubricants
- Longer lifetime
- Extended oil change intervals
- Less equipment downtime
- Less maintenance cost
- Less waste disposal
- Lifetime fill potential
- Advantage through inhouse oil sample analysis

High Performance Environmentally Acceptable Lubricants are our core competence since 1983.

Global acceptance through eco-labels

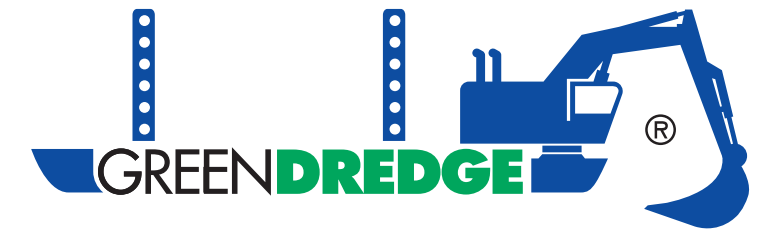
 United Kingdom	 Norway	 Denmark	 Germany	 Japan
 South Korea	 Croatia	 Sweden	 Czech Republic	 USA
 Netherlands	 Europe	 Italy	 USA	 USA

Approved by leading manufacturers

Note Selection of OEMs that use, recommend or approve PANOLIN lubricants

References and dredging types



Backhoe dredge



Trailing suction hopper dredge

6



Backhoe dredge

Robust lubricants:
When 24/7 is demanded

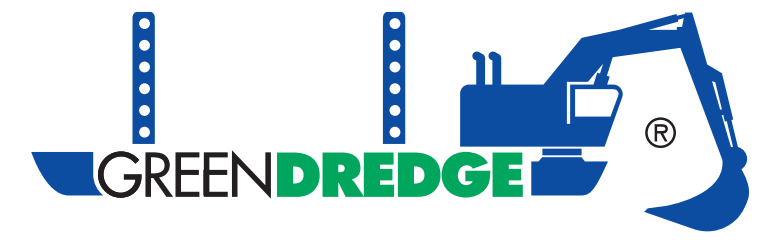
7



Trailing suction hopper dredge

Low maintenance lubricants:
When downtime is not an option

References and dredging types



Clamshell dredge



Pipe laying vessels



Offshore construction platforms

8



Cutter suction dredge

Reliable lubricants:
To assure smooth operation

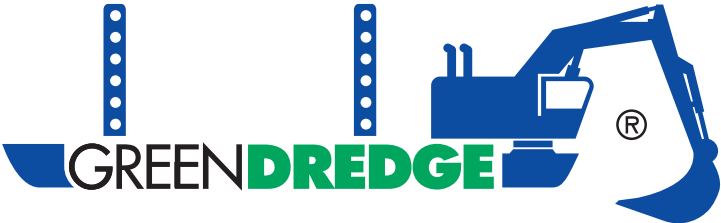
9



Offshore construction vessels

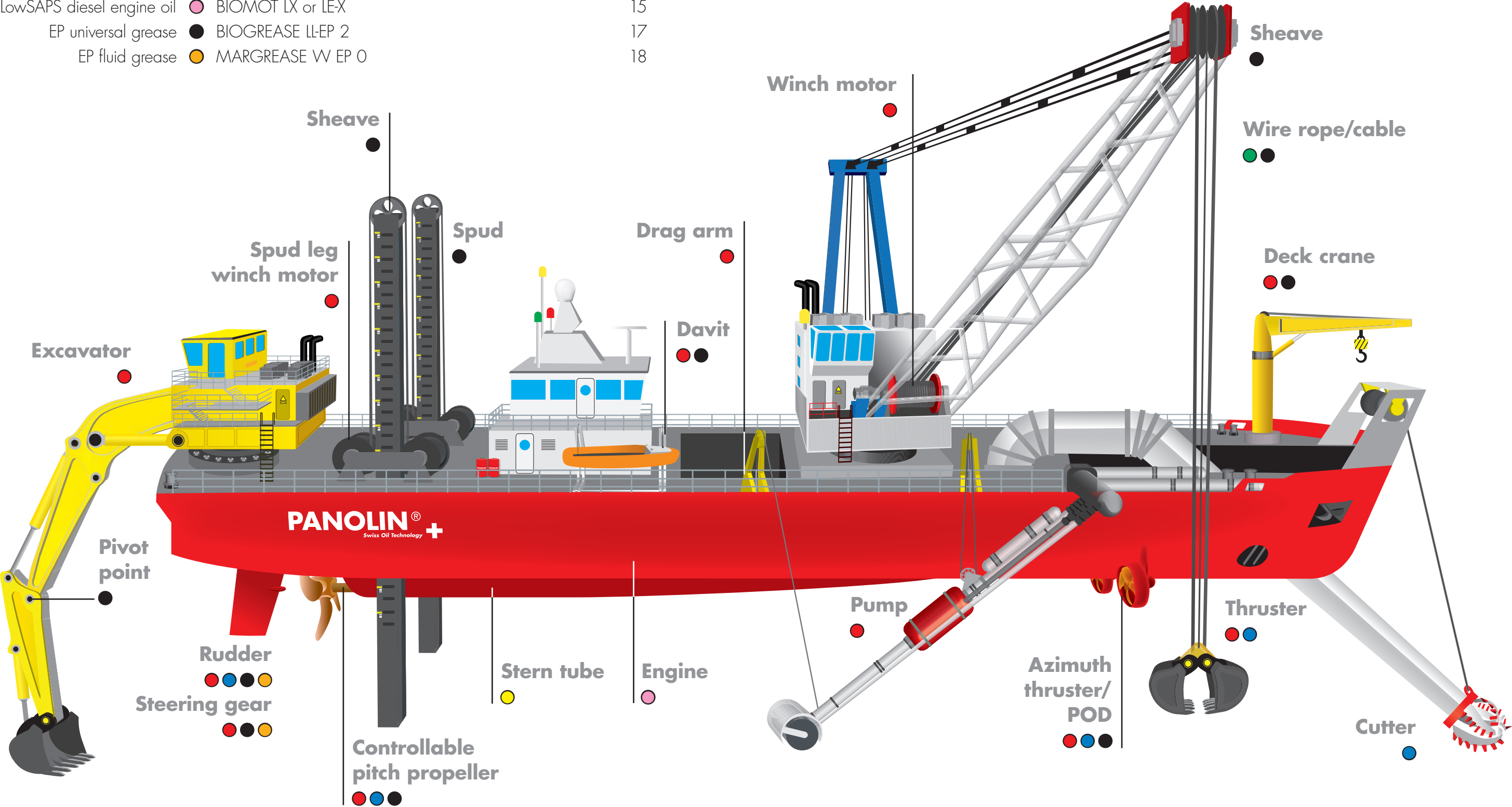
Long-life lubricants:
Where time is money

PANOLIN EALs application guide



Product type	PANOLIN	Page
Hydraulic fluid	● HLP SYNTH	12
Industrial gear oil	● EP GEAR SYNTH or MARGEAR	13
Stern tube lubricant	● STELLA MARIS	14
Cable/chain lubricant	● BIOTRACK E	14
LowSAPS diesel engine oil	● BIOMOT LX or LE-X	15
EP universal grease	● BIOGREASE LL-EP 2	17
EP fluid grease	● MARGREASE WV EP 0	18

10



11

PANOLIN HLP SYNTH

Hydraulic fluid – readily biodegradable, saturated synthetic esters

Features and benefits

- Fully synthetic, high-performance, readily biodegradable, zinc-free and environmentally friendly hydraulic fluid, based on saturated synthetic esters with special additive technology
- Minimally toxic
- Extremely long oil-change interval «lifetime filling» – enables higher machine efficiency
- Increases availability and reliability of your equipment due to greater power reserves
- Outstanding extreme-pressure characteristics
- Excellent cold flow characteristics (extremely low pour point)
- Prevents gumming and deposits of ageing products even under high thermal load
- Excellent oxidation resistance at high temperatures
- Great dielectric strength

Environmental compatibility

- It is decomposed by micro-organisms in water and/or soil almost without any residues.
- ASTM D-6046-98a: P_w1, T_w1, T_s1
 - Biodegradability acc. to OECD 301 B: > 60%
 - CO₂ reduction thanks to longer oil-change intervals
 - Eco Labels from: Czech Republic, Germany, Italy, Japan, Korea, Sweden
 - US EPA VIDA (Vessel Incidental Discharge Act), VGP 2013 (Vessel General Permit) – **Note:** Page 16
 - Water hazard classifications acc. to AwSV: awg (35020, 35030, 35040), WGK 1 (35050, 35060)

Specifications

ASTM D 943 (Dry TOST test) > 5 000 h / ASTM D 2070 (modified, 1 680 h) / ASTM D 8029
FZG Test A/8.3/90 load stage 12
ISO 15 380/HEES
Vickers V104 C



Technical data (mean values, subject to normal tolerances – TDS 20210422)

PANOLIN HLP SYNTH	Product No.	Density g/cm³ 15 °C	Viscosity in mm²/s		Flashpoint COC in °C	Pour point in °C	Viscosity index	Iodine No.
15	35020	0.925	15.6	3.9	222	< – 60	151	< 6
22	35030	0.916	20.5	4.5	220	– 58	136	< 6
32	35040	0.915	33.3	6.3	240	– 58	142	< 7
46	35050	0.916	46.7	8.2	240	– 57	150	< 10
68	35060	0.921	68.6	11.1	240	– 55	154	< 12



PANOLIN EP GEAR SYNTH

Industrial gear oil – readily biodegradable, saturated synthetic esters

Features and benefits

- Fully synthetic, high-performance and readily biodegradable lubricant, based on saturated synthetic esters for industrial gear boxes, roller bearings and slide bearings
- Minimally toxic
- Reduces micro-wear of surface roughness on friction surfaces in aggregates
- Outstanding extreme-pressure characteristics
- Excellent oxidation resistance at high temperatures
- Prevents gumming even under high thermal load
- Better adhesion to metal surfaces than mineral-oil based gear oils
- Outstanding anti-wear and anti-corrosion properties
- Extreme shear-resistant multigrade gear oil with a wider thermal operating range than mineral oil

Environmental compatibility

- It is decomposed by micro-organisms in water and/or soil almost without any residues.
- Biodegradability acc. to OECD 301 F: > 60% (27325, 27335)
 - Biodegradability acc. to OECD 301 F: > 60% (27320, 27330: read across)
 - US EPA VIDA (Vessel Incidental Discharge Act), VGP 2013 (Vessel General Permit) – **Note:** Page 16
 - Water hazard classifications acc. to AwSV: WGK 1

Specifications

DIN 51 502/CLP E, 51 517/CLP E
FZG Test A/16.6/140 load stage 12

Technical data (mean values, subject to normal tolerances – TDS 20201208)

PANOLIN EP GEAR SYNTH	Product No.	Density g/cm³ 15 °C	Viscosity in mm²/s		Flashpoint COC in °C	Pour point in °C	Viscosity index
68	27320	0.919	69.0	10.8	290	– 54	146
100	27325	0.920	100.0	14.1	300	– 45	144
150	27330	0.921	150.0	18.8	300	– 43	142
220	27335	0.923	220.0	24.0	300	– 41	136

PANOLIN MARGEAR

Industrial gear oil – readily biodegradable, saturated synthetic esters

Features and benefits

- Fully synthetic and environmentally friendly gear oil, based on renewable saturated synthetic esters
- Minimally toxic
- Reduces micro-wear of surface roughness on friction surfaces in aggregates
- Outstanding extreme-pressure characteristics
- Excellent oxidation resistance at high temperatures
- Prevents gumming even under high thermal load
- Better adhesion to metal surfaces than mineral-oil based gear oils
- Outstanding anti-wear and anti-corrosion properties
- Extreme shear-resistant multigrade gear oil with a wider thermal operating range than mineral oil

Environmental compatibility

- It is decomposed by micro-organisms in water and/or soil almost without any residues.
- Biodegradability acc. to OECD 301 B: > 60%
 - EN 16 807
 - US EPA VIDA (Vessel Incidental Discharge Act), VGP 2013 (Vessel General Permit) – **Note:** Page 16

Specifications

DIN 51 502/CLP E, 51 517/CLP E
FZG Test A/8.3/90 load stage > 12
FZG Test A/10/16.6/140 load stage 12 (28520)

Technical data (mean values, subject to normal tolerances – TDS 20201104)

PANOLIN MARGEAR	Product No.	Density g/cm³ 15 °C	Viscosity in mm²/s		Flashpoint COC in °C	Pour point in °C	Viscosity index
68	28518	0.912	70.4	11.2	254	– 30	151
100	28520	0.919	100.9	14.6	252	– 30	150
150	28522	0.925	149.9	19.7	249	– 33	151
220	28524	0.939	214.4	25.7	244	– 30	152
320	28526	0.940	324.0	36.4	246	– 27	152

PANOLIN STELLA MARIS

Stern tube lubricant – readily biodegradable, saturated synthetic esters

Features and benefits

- Fully synthetic and environmentally friendly stern tube lubricant, based on renewable saturated synthetic esters
- Minimally toxic
- Excellent lubricity
- Does not contain emulsifiers
- High polarity that protects metal surfaces
- No varnish due to thermal oxidation
- Great hydrolytic stability
- Outstanding anti-wear and anti-corrosion properties

Environmental compatibility

It is decomposed by micro-organisms in water and/or soil almost without any residues.

- Biodegradability acc. to OECD 301 B: > 60%
- Croatia Eco-Label (28445, 28450, 28455, 28460)
- EN 16807
- EU Ecolabel, category 3 (28445: DE/027/120, 28450: DE/027/121, 28455: DE/027/122, 28460: DE/027/123)
- RINA Green Plus – Italy (28445, 28450, 28455, 28460)
- US EPA VIDA (Vessel Incidental Discharge Act), VGP 2013 (Vessel General Permit) – **Note:** Page 16



Technical data (mean values, subject to normal tolerances – TDS 20201104)

PANOLIN STELLA MARIS	Product No.	Density g/cm ³ 15 °C	Viscosity in mm ² /s		Flashpoint COC in °C	Pour point in °C	Viscosity index
			40 °C	100 °C			
68	28445	0.934	64.8	10.6	282	– 36	152
100	28450	0.937	96.5	14.5	284	– 33	155
150	28455	0.941	156.5	21.1	286	– 33	159
220	28460	0.944	228.6	28.5	288	– 33	162
320	28465	0.947	331.2	37.8	290	– 33	164

PANOLIN BIOTRACK E

Cable/chain lubricant – readily biodegradable, synthetic esters

Features and benefits

- Fully synthetic and environmentally friendly cable/chain lubricant, based on renewable synthetic esters
- Minimally toxic
- Excellent oxidation resistance at high temperatures
- Reduces friction
- Very good adhesion

Environmental compatibility

It is decomposed by micro-organisms in water and/or soil almost without any residues.

- Biodegradability acc. to OECD 301 B: > 60%
- US EPA VIDA (Vessel Incidental Discharge Act), VGP 2013 (Vessel General Permit) – **Note:** Page 16
- Water hazard classifications acc. to AwSV: WGK 1

Technical data (mean values, subject to normal tolerances – TDS 20201104)

PANOLIN BIOTRACK E	Product No.	Density g/cm ³ 15 °C	Viscosity in mm ² /s		Flashpoint COC in °C	Pour point in °C	Viscosity index
			40 °C	100 °C			
68	54918	0.921	73.8	13.5	274	< – 45	188
320	54926	0.958	320.0	37.0	> 256	– 36	164
700	54930	0.966	750.0	77.6	> 250	– 21	180

PANOLIN BIOMOT LX

LowSAPS diesel engine oil – readily biodegradable, saturated synthetic esters

Features and benefits

- Fully synthetic engine oil, based on saturated synthetic esters for the latest diesel engines
- Diesel engine oil with extremely low sulphate ash, phosphor and sulphur content
- The combination of synthetic base oils with special additive technology ensures extremely low oil consumption
- Sustainably prevents blockage of exhaust particle filters and corrosion of oxidation catalyzers
- Ensures excellent engine lubrication both at high operating temperatures and at extremely low ambient temperatures
- Prevents gumming and deposits of ageing products even under high thermal load
- Minimally toxic

Environmental compatibility

It is decomposed by micro-organisms in water and/or soil almost without any residues.

- Biodegradability acc. to OECD 301 B: > 60%
- Water hazard classifications acc. to AwSV: WGK 1

Specifications

ACEA E6, E7, E9
API CJ-4/SN
CAT ECF-3, ECF-2, ECF-1-a
JASO DH-2

Technical data (mean values, subject to normal tolerances – TDS 20201104)

PANOLIN BIOMOT	Product No.	Density g/cm ³ 15 °C	Viscosity in mm ² /s		Flashpoint COC in °C	Pour point in °C	Viscosity index
			40 °C	100 °C			
LX 10W-40	07350	0.920	91.1	14.3	> 220	– 40	163

PANOLIN BIOMOT LE-X

LowSAPS diesel engine oil – readily biodegradable, saturated synthetic esters

Features and benefits

- Fully synthetic, readily biodegradable and long-life engine oil, based on saturated synthetic esters for the latest diesel engines
- Diesel engine oil with extremely low sulphate ash, phosphor and sulphur content
- The combination of synthetic base oils with special additive technology ensures extremely low oil consumption
- Extended oil-change intervals
- Reduces friction and wear
- Excellent oxidation resistance at high temperatures
- Outstanding anti-wear and anti-corrosion properties
- Good lubricating film stability
- Minimally toxic

Environmental compatibility

It is decomposed by micro-organisms in water and/or soil almost without any residues.

- Biodegradability acc. to OECD 301 B: > 60%
- Water hazard classifications acc. to AwSV: WGK 1

Specifications

ACEA E6, E7, E9
API CJ-4/CK-4

Technical data (mean values, subject to normal tolerances – TDS 20201230)


PANOLIN BIOMOT	Product No.	Density g/cm ³ 15 °C	Viscosity in mm ² /s		Flashpoint COC in °C	Pour point in °C	Viscosity index
			40 °C	100 °C			
LE-X 5W-30	07410	0.928	63.6	12.1	228	– 60	191

Compliance with EPA VIDA/VGP 2013

Assessment in accordance to requirements of Vessel General Permit 2013



- a VGP accepts result based on formulation and main constituents. See Appendix A, VGP 2013 final version
- b VGP accepts testing of formulation. See Appendix A, VGP 2013 final version
- c OECD test method valid for single substances testing only; data reported should be seen as a summary of all single > 1 % components in stated formulation
- d Report

 Lubricating oils				
Characteristics of test	Units	Specification	Result	Method
Biodegradability ^a	% ThOD	> 60	> 60	OECD 301, 306
Toxicity ^b				
Algae	LC ₅₀	> 100 mg/l	> 100	OECD 201
Daphnia	EC ₅₀	> 100 mg/l	> 100	OECD 202
Fish	LC ₅₀	> 100 mg/l	> 100	OECD 203
Bioaccumulation ^c	Log K _{ow}	< 3 or > 7	pass	OECD 107, 117
Visible sheen	Gloss, visual color etc.	– ^d	no visual color	58 FR 12 507

EPA test requirements state, all vessels must use an EAL in all oil to sea interfaces.
“Environmentally Acceptable Lubricants” means lubricants that are “biodegradable” and “minimally toxic” and are “not bioaccumulative” as defined in Appendix A of the Vessel General Permit.
PANOLIN has conducted tests to EPA requirements for all standards described in the 2013 Vessel General Permit (review above chart for test results)

Product type

- Hydraulic fluid ● HLP SYNTH 15/22/32/46/68
- Industrial gear oil ● EP GEAR SYNTH 68/100/150/220
- Industrial gear oil ● MARGEAR 68/100/150/220/320
- Stern tube lubricant ● STELLA MARIS 68/100/150/220/320
- Cable/chain lubricant ● BIOTRACK E 68/320/700

A good feeling:
Knowing that the lubricant is environmentally friendly

PANOLIN BIOGREASE LL-EP 2

EP universal grease – readily biodegradable, synthetic esters

- Features and benefits**
- Fully synthetic, readily biodegradable EP universal lubricating grease for exposed applications
 - Excellent water wash-out resistance
 - Minimally toxic
 - Good mechanical stability
 - Excellent oxidation resistance at high temperatures
 - Outstanding anti-wear and anti-corrosion properties
 - Wide temperature range
 - Excellent load-bearing capacity due to special additive technology

- Environmental compatibility**
- Ecolabel «Der blaue Engel» • EU Ecolabel (DE/027/255) • KWF Label • Swedish standard 15 54 70 (pending)
 - US EPA VIDA/VGP 2013 **Note:** Page 19

Technical data (mean values, subject to normal tolerances – TDS 20210330)

Product No.	72888
NLGI	2
Soap/thickener type	Lithium
Dropping point (IP 396)	> 190 °C
VKA calotte (ASTM D2266)	0.53 mm
VKA OK load (DIN 51 350)	3 000 N
VKA weld load (DIN 51 350)	3 200 N
Behavior vs. Water (DIN 51 807-1)	1 – 90
Corrosion protection (EMCOR – DIN 51 802; dest. water)	0 – 0
Corrosion protection (EMCOR – DIN 51 802; synth. seawater)	0 – 0
Copper corrosion (DIN 51 811)	1
Water wash out (ASTM D1264)	7.4%
Operation temperature range (permanent)	– 30 °C to 120 °C
Designation (DIN 51502)	KPE 2 K–30
Base	Synthetic esters
Base oil viscosity at 40 °C	320
Colour	Beige



● PANOLIN MARGREASE W EP 0

EP fluid grease – readily biodegradable, synthetic esters

Features and benefits

- Fully synthetic, readily biodegradable EP fluid grease for automatic injection systems
- Good water wash-out resistance
- Minimally toxic
- Good mechanical stability
- Outstanding anti-wear and anti-corrosion properties
- Wide temperature range

Environmental compatibility

- EU Ecolabel (pending)
- Swedish standard 15 54 70
- US EPA VIDA/VGP 2013 **Note:** Page 19



Technical data (mean values, subject to normal tolerances – TDS 20210414)

Product No.	72922
NI GI	0
Soap/thickener type	Anhydrous Calcium
Dropping point (IP 396)	> 140 °C
VKA OK load (DIN 51350)	3400 N
VKA weld load (DIN 51350)	3600 N
Behavior vs. Water (DIN 51807-1)	0
Copper corrosion (DIN 51811)	1
Operation temperature range (permanent)	– 40 °C to 100 °C
Designation (DIN 51502)	KPE 0 G–40
Base	Synthetic esters
Base oil viscosity at 40 °C	460
Colour	Yellow

18



Compliance with EPA VIDA/VGP 2013

Assessment in accordance with requirements of Vessel General Permit 2013



- a** VGP accepts result based on formulation and main constituents. See Appendix A, VGP 2013 final version
- b** VGP accepts testing of formulation. See Appendix A, VGP 2013 final version
- c** Limit for loss lubrication: > 1000 mg/l
- d** OECD test method valid for single substances testing only; data reported should be seen as a summary of all single > 1 % components in stated formulation
- e** Report

GREENMARINE® Greases				
Characteristics of test	Units	Specification	Result	Method
Biodegradability ^a	% ThOD	> 60	> 60	OECD 301, 306
Toxicity ^b				
Algae	LC ₅₀	> 1000mg/l ^c	> 1000	OECD 201
Daphnia	EC ₅₀	> 1000mg/l ^c	> 1000	OECD 202
Fish	LC ₅₀	> 1000mg/l ^c	> 1000	OECD 203
Bioaccumulation ^d	Log K _{ow}	< 3 or > 7	pass	OECD 107, 117
Visible sheen	Gloss, visual color etc.	– ^e	no visual color	58 FR 12 507

EPA test requirements state, all vessels must use an EAL in all oil to sea interfaces. “Environmentally Acceptable Lubricants” means lubricants that are “biodegradable” and “minimally toxic” and are “not bioaccumulative” as defined in Appendix A of the Vessel General Permit. PANOLIN has conducted tests to EPA requirements for all standards described in the 2013 Vessel General Permit (review above chart for test results)

19

Product type

- EP universal grease
- EP fluid grease

PANOLIN

- BIOGREASE LL-EP 2
- MARGREASE W EP 0

A good feeling:
Knowing that the lubricant is environmentally friendly

PANOLIN is a statement for

- Advanced Technology
- Environmental Responsibility
- Security

The sustainable PANOLIN concepts



GREENMACHINE®



PANOLIN offers a wide range of high performance biodegradable lubricants for diverse applications.
For further information please contact PANOLIN International Inc.

PANOLIN®
Swiss Oil Technology 

PANOLIN International Inc.
CH-8322 Madetswil
Tel. +41 (0)44 956 65 65
Fax +41 (0)44 956 65 75
www.panolin.com
international@panolin.com

